CLAIMS

1. A holographic recording method comprising: branching a laser beam into a reference beam and an object beam; guiding the reference beam to a reference optical system, and at the same time guiding the object beam to an object optical system; phase-spatial-modulating the reference beam in the reference optical system; amplitude-spatial-modulating the object beam in the object optical system; and projecting each of the beams onto a holographic recording medium to thereby record interference fringes, wherein

the reference beam is phase-spatial-modulated in the reference optical system by means of a phase code mask in which a required phase code pattern is recorded as a hologram in advance.

2. A holographic recording apparatus, comprising: a laser beam source; a reference optical system which guides one of branched laser beams resulting from branching a laser beam from this laser beam source to a holographic recording medium as a reference beam; an object optical system which guides the other of the branched laser beams to the holographic recording medium as an object beam; a phase code mask which is arranged in the reference optical system, has a required phase code pattern recorded as a hologram in advance, and phase-spatial-modulates the reference beam; and an amplitude spatial light

modulator which is arranged in the object optical system and amplitude-spatial-modulates the object beam according to information to be recorded, wherein the phase-spatial-modulated reference beam and the amplitude-spatial-modulated object beam are projected onto the holographic recording medium to thereby perform holographic recording of the information.

3. The holographic recording apparatus according to claim 2, wherein the phase code pattern is angle-multiplex-recorded in the phase code mask.

4. The holographic recording apparatus according to claim 3, comprising an angle modulator which modulates at least one of an angle of the phase code mask with respect to the laser beam and an incident luminous intensity of the laser beam on the phase code mask.

5. The holographic recording apparatus according to claim 2, wherein the phase code pattern is spherical-shift-multiplex-recorded in the phase code mask.

6. The holographic recording apparatus according to claim 5, comprising a mask driving device which translationally moves the phase code mask in a direction orthogonal to the incident laser beam.

7. The holographic recording apparatus according to any one of claims 2 to 6, comprising a beam expander which expands a beam diameter of the laser beam from the laser beam source,

and wherein: the phase code mask serves as means which branches the laser beam having the expanded beam diameter; and a diffraction beam of the laser beam in the phase code mask serves as the reference beam, and a transmission beam thereof serves as the object beam.

8. A holographic reproducing apparatus, comprising: a phase code mask which has a phase code pattern recorded as a hologram and phase-modulates a projected laser beam by use of the phase code pattern; a laser beam source; a beam expander which expands a beam diameter of a laser beam from the laser beam source; a reference optical system which projects the laser beam having the expanded beam diameter onto the phase code mask and guides a diffraction beam thereof to a holographic recording medium; a Fourier lens disposed after the phase code mask in the reference optical system; and a CCD which receives the diffraction beam formed from a reference beam projected onto the holographic recording medium to thereby reproduce information, wherein the information is phase-code-multiplex-recorded in the holographic recording medium in advance so as to correspond to the phase code pattern of the phase code mask.

9. The holographic reproducing apparatus according to claim 8, wherein: the phase code pattern is multiplex-recorded in the phase code mask and the information is phase-code-multiplex-recorded in the holographic recording medium; and

the phase code mask is configured to be controllable by means of a mask driving device such that one of the recorded phase code patterns is recreated.

10. A holographic recording and reproducing apparatus, comprising: a laser beam source; a beam expander which expands a beam diameter of a laser beam from the laser beam source; a polarizing beam splitter which splits the laser beam having the expanded beam diameter into two linearly polarized beams having orthogonal vibration planes; a reference optical system which guides one linearly polarized beam branched by means of the polarizing beam splitter to a holographic recording medium; an object optical system which guides the other linearly polarized beam to the holographic recording medium; a 1/2 wave plate, a phase code mask, and a Fourier lens which are arranged in the reference optical system in order from the side of the polarizing beam splitter; a mask driving device which drives the phase code mask; and an amplitude spatial light modulator and a Fourier lens which are arranged in the object optical system in order from the side of the polarizing beam splitter, wherein: the phase code mask has the phase code pattern multiplex-recorded as a hologram and is configured to phase-modulate the projected reference beam by means of the phase code pattern; the amplitude spatial light modulator is configured to amplitude-modulate the object beam according to information to be recorded; and the phase-modulated reference

beam and the amplitude-modulated object beam are projected onto the holographic recording medium to thereby phase-code-multiplex-record the information through interference fringes of the reference beam and the object beam.